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ENVIRONMENT AND ECONOMICS

Progress report, including a plan of action, on the development and use of environmental indicators

Addendum

Programme of work on indicators for sustainable development

Note by the Executive Director

1. The United Nations Department for Policy Coordination and Sustainable Development (DPCSD), as task manager for chapter 40 of Agenda 21, in close cooperation with UNEP and the United Nations Statistical Division (UNSTAT), have been coordinating activities in the development of environmental indicators. In a report submitted to the Commission on Sustainable Development at its third session, from 11-28 April 1995, the Secretary-General outlines progress in the development of information for decision-making (document E/CN.17/1995/18) and, in annex 1 to that report, sets out a cooperative work programme of future environmental indicators activities proposed to the Commission. Within the consensus-building process, the Division for Sustainable Development of DPCSD, along with other agency and national partners, developed a framework of indicators for the proposed programme of work. That "Driving force-State-Response" framework is also discussed in annex 1 to the report of the Secretary-General.

2. This addendum consists of annex 1 to the report of the Secretary-General to the Commission on Sustainable Development at its third session, containing the proposed common framework for the indicators, criteria for choosing indicators, a programme of work and a menu of indicators for sustainable development. Within the text of the annex, references to "the present report" should be understood as references to the main document (E/CN.17/1995/18).

* UNEP/GC.18/1.

Annex I

PROGRAMME OF WORK ON INDICATORS FOR SUSTAINABLE DEVELOPMENT

Introduction

1. Chapter 40 of Agenda 21 calls for the development of indicators for sustainable development. In particular, it requests countries at the national level, and international governmental and non-governmental organizations at the international level, to develop the concept of indicators of sustainable development in order to identify such indicators (para. 40.6). This issue was raised during the first two sessions of the Commission on Sustainable Development, at which time a large number of countries emphasized the urgent need for those indicators. Other countries expressed some concern and insisted that indicators be developed in close contact with Governments. Pursuant to the multi-year thematic programme of work adopted by the Commission at its first session, the progress achieved on developing these indicators, within the context of chapter 40 of Agenda 21, will be discussed by the Commission during its third session.

2. Indicators are called for when there is a need for informed decision-making and associated, cost-effective data collection so as to respond to that need. In order to assist decision makers at all levels, and to increase focus on sustainable development, indicators for monitoring progress towards sustainable development are needed. The value of indicators as policy instruments is enhanced when they are used in combination with targets that have been set as part of national policies.

3. The objective of this work programme is to make the indicators for sustainable development accessible to decision makers at the national level by defining them, elucidating their methodologies and providing training and other capacity-building activities, as relevant. Indicators, as used in national policies, may also be used in the national reports to the Commission and other intergovernmental bodies.

4. A number of countries are developing their own indicators, for the environment as well as for sustainable development. In addition, several organizations, both within and outside the United Nations system, have been working on the development of indicators related to sustainable development. (Additional information on these activities is contained in the main body of the present report, paras. 20-24.) The current role of the Department for Policy Coordination and Sustainable Development of the United Nations Secretariat, as task manager of this issue, is to bring together the many actors in this field, to build on their work and to propose a cooperative programme for indicators for sustainable development that may directly serve the needs of the Commission on Sustainable Development, as well as all Member States.

Indicators for sustainable development

5. When developing the indicators, it is important to address the challenge of fully integrating the social, economic, environmental and institutional aspects

of sustainable development. Much further work, primarily by the scientific community, is needed in order to understand and explain these interlinkages.

6. Social indicators have been developed over the past years and are used all over the world. Economic indicators have also been used for many years at national, regional and international levels. It is feasible to select from among these social and economic indicators some that capture the specific issues most relevant to sustainable development. Environmental indicators have been developed more recently. For some of the environmental aspects, considerably more work needs to be done to make the data available.

7. Based on the relevant indicators that are available, it is proposed that the Commission on Sustainable Development agree to work proceeding on the basis of a menu of indicators, as presented below, with the understanding that this is a flexible, working instrument which will be fine-tuned with respect to the needs of countries after further methodological work, testing and training. It is further proposed that the Commission approve the programme of work on indicators for sustainable development, as contained in paragraphs 22-26 below.

8. It is also proposed that the Commission on Sustainable Development encourage continued cooperation with the work under way on environment indicators under the auspices of the Statistical Commission.

Highly aggregated indicators

9. Concurrently, work may proceed with developing highly aggregated indicators for sustainable development. Although this represents a longer-term effort, it is important for three reasons: it explores the relationship among the variables, which lies at the heart of the linkages intrinsic to sustainable development; it concentrates information collection and analysis and facilitates presentation to decision makers; and it may serve as the basis of an early warning system, if desired.

10. In addition to other existing efforts in this area, a project is now being undertaken by SCOPE, in cooperation with UNEP, aiming at developing highly aggregated indicators for sustainable development. This initiative is currently focusing on the environmental aspects of sustainability, although the project could be broadened to focus on other aspects of sustainable development as well.

A menu of indicators for sustainable development

11. A menu of indicators, as contained in this annex, is proposed for use by decision makers in monitoring progress at a national level towards sustainable development through the implementation of Agenda 21. It is fully recognized that there is need for flexibility, as the conditions, activities and priorities for sustainable development differ from country to country. At the same time, the widely articulated desire for international consistency calls for the development of standardized concepts, definitions and classifications of indicators.

12. Regional workshops and capacity-building programmes are needed in order to facilitate the use of the menu of indicators at a national level. In addition

to the existing experience of a range of countries, testing of the indicators in three to four countries could be used to gain experience and further develop the indicators, and evaluation of the use of the indicators at the national level, and national and international developments, could be used to adjust the menu of indicators if necessary.

13. The indicators in the proposed framework have been developed, in accordance with the following criteria, to be:

(a) Primarily national in scale or scope (countries may also wish to use indicators at State and provincial levels);

(b) Relevant to the main objective of assessing progress towards sustainable development;

(c) Understandable, that is to say, clear, simple and unambiguous;

(d) Realizable within the capacities of national Governments, given their logistic, time, technical and other constraints;

(e) Conceptually well founded;

(f) Limited in number, remaining open-ended and adaptable to future developments;

(g) Broad in coverage of Agenda 21 and all aspects of sustainable development;

(h) Representative of an international consensus, to the extent possible;

(i) Dependent on data that are readily available or available at a reasonable cost to benefit ratio, adequately documented, of known quality and updated at regular intervals.

14. As noted, the menu of indicators may change and new indicators may be included, for example, within the context of international legal agreements, or as national-level experience is gained. Furthermore, there are some potentially important indicators that require further methodological work before they can be used. This is especially the case for various ecosystem (georeferenced) indicators, and as regards the following issues, for which indicators are not included in the menu at this stage (references are to chapters of Agenda 21):

Chapter 4 and others: differential consumption patterns of the wealthy and the poor (including access to clean water among the poor; patterns of consumption of clean water among the wealthy)

Chapters 8, 38, 39 and 40: decision-making structures (driving force indicators); also, strengthening of "traditional information" (driving force and response indicators)

Chapter 13: sustainable mountain development (driving force, state and response indicators)

Chapter 15: issues of biodiversity (driving force)

Chapter 16: issues surrounding biotechnology (driving force, state and response indicators)

Chapter 17: oceans, all kinds of seas and coastal areas (response indicators)

Chapter 19: toxic chemicals

Chapter 20: hazardous wastes (response indicators)

Chapter 21: industrial/municipal discharges

Chapters 23-32: participation and representation of major groups in decision-making (driving force, state and response indicators)

Chapter 34: transfer of technology (driving force, state and response indicators)

Chapter 35: science (driving force, state and response indicators)

Chapter 37, and others: capacity-building (driving force, state and response indicators).

15. Research and experimentation with advanced social, economic and institutional indicators that might more effectively measure progress towards sustainable development and continued research and experimentation with environmental indicators appropriate for measuring progress towards sustainable development should be endorsed. There may also be a need for subsets and other, often more comprehensive sets of indicators for other purposes, including subnational, spatial and sectoral assessments.

The framework

16. The indicators in the menu are presented in a Driving force-State-Response (DSR) framework. The DSR framework is adapted from the widely agreed framework for environmental indicators, namely, the Pressure-State-Response framework. The concept of pressure has been replaced by that of "Driving forces", in order to accommodate more accurately the addition of social, economic and institutional indicators. Driving force indicators indicate human activities, processes and patterns that impact on sustainable development; "State" indicators indicate the "state" of sustainable development; and "Response" indicators indicate policy options and other responses to the changes in the state of sustainable development. Experience with this framework has been largely with environmental indicators only; its applicability to the broader needs of sustainable development will be tested through the programme of work.

17. It should be emphasized that the "column" and "row" structure of the trial menu of sustainable development indicators may be modified within the next few years, as more experience is gained. More effort, for example, may be needed to

represent the relationship between cause and effect, or impact. The use of the DSR framework is viewed as the first step in an iterative process.

18. In the menu, the indicators are grouped in categories covering the social, economic, environmental and institutional aspects of sustainable development. The indicators are related to chapters of Agenda 21. The coverage of the four aspects of sustainable development and of all the chapters of Agenda 21 ensures that most significant aspects of sustainable development are monitored by the indicators.

19. The result of this combined structure is a series of cells within which the indicators are presented. It is important to understand that there is as yet no implied causality among indicators between cells, either horizontally or vertically. Significant work must be undertaken on the question of interlinkages among indicators before causal relationships can be understood and expressed.

Actors and the programme of work

20. For clusters of indicators, various organizations will have the task of assuming a leading role in a transparent consultative process for the purpose of further developing the indicators, as relevant, including the underlying methodology, and of analysing the data availability for each indicator in order to provide a full description of each indicator in a set of methodology sheets. Based on their mandates and current activities, a number of organizations have agreed to serve as "lead agencies" for this purpose. These organizations include UNSTAT, the Department for Policy Coordination and Sustainable Development of the United Nations Secretariat, ESCAP, UNDP, the United Nations Children's Fund (UNICEF), UNDP/UNSO, UNEP, the secretariat of the Basel Convention, the United Nations Centre for Human Settlements (Habitat), the United Nations Conference on Trade and Development (UNCTAD), ILO, FAO, the United Nations Educational, Scientific and Cultural Organization (UNESCO), WHO, the World Bank, UNIDO, and OECD and IUCN. In addition, this process will include, to the extent possible and as appropriate, the regional commissions and other interested organizations in the United Nations system, other intergovernmental organizations, national Governments, non-governmental organizations and other representatives of major groups.

21. The methodology sheets will contain, inter alia, the following information:

(a) An introduction that provides a statement of purpose, the policy relevance of the indicator, and its relationship to sustainable development;

(b) A methodological description of the indicators and the underlying definitions, including a short description of the indicators in relation to the Driving force-State-Response framework; and information on interpretation and design of the indicator;

(c) For each indicator, an assessment of the availability of data from national and international sources;

(d) Further readings and other references for additional information and contact points.

Summary of elements in the programme of work

22. With regard to activities related to the menu of indicators:

(a) Information exchange (1995 and continuing thereafter): there is a need for enhanced information exchange among all interested organizations, Governments and major groups on research, methodological and practical activities associated with indicators for sustainable development. At the international level, this should include, inter alia, establishing a freely accessible database with this information. To the extent possible, the relationship of indicator-related activities to national targets and needs should be specified. At the national level, the Sustainable Development Network Programme of UNDP could assist in coordinating the relevant information and improving access to the data;

(b) Methodology sheets (1995-1996): the lead agencies, as indicated above, through a transparent, consultative process, will describe the indicators in the menu, including their policy relevance and underlying methodology, and assess the data availability and the data sources for each indicator. This information could be included in a set of initial methodology sheets to be made available to Governments by 1996. Governments could choose from the menu those indicators relevant to their respective problems and priorities for use in national policy-making. The countries may also use the indicators, if they wish to do so, in their national reporting to the Commission on Sustainable Development at its fifth session in 1997;

(c) Training and capacity-building (1995-1998):

(i) Training should be provided for Governments and other relevant groups in using the indicators for monitoring progress towards sustainable development at a national level. This implies assistance, where requested, in adapting the menu of indicators for the needs/targets of the country. Further capacity-building programmes should be initiated, covering the whole field from collection of data to use in policy processes;

(ii) Priority should be given to training the trainers, including national scientists and other experts who could then provide broader training for the appropriate government actors. This training might best be provided at the regional level, with the support of the regional commissions or other regional organizations. There is a need to explore techniques for training that are more innovative and effective than those used traditionally;

(iii) Coordination of training activities at the national level is important and may be undertaken within the framework of Capacity 21. This includes broadening sectoral efforts of ongoing or projected activities of United Nations system organizations. National forums should be organized, for example, through national councils for

sustainable development, involving the government, the United Nations system, other intergovernmental organizations and representatives of major groups and of the media, to undertake capacity-building for indicators in the country;

(iv) To the extent possible, existing resources will be pooled and utilized in an efficient and cooperative manner for these activities. As needs arise, extrabudgetary resources may also be required and will be sought;

(d) Monitoring experiences in a few selected countries (1996-1998): testing of the indicators in three to four countries could be used to gain experience, assess applicability and further develop the indicators for sustainable development. It should be noted that testing and capacity-building are mutually reinforcing and should be planned in tandem;

(e) Evaluation of the menu (2000): the use of indicators for sustainable development at a national level is evaluated on all experience gained, and the menu of indicators adjusted as necessary.

23. With regard to developing highly aggregated indicators (the SCOPE/UNEP project): with the menu of indicators as an input, highly aggregated indicators will be developed to further facilitate decision-making at all levels. This could be undertaken and coordinated by the SCOPE/UNEP project, benefiting from the experience gained with the menu of indicators and focusing on all aspects of sustainable development.

24. With regard to further work on interlinkages: the scientific community is invited to undertake further work on identifying and assessing the linkages among the economic, social, institutional and environmental elements of sustainable development. SCOPE could facilitate the coordination of these efforts. In addition, a joint WHO/UNEP HEADLAMP Project is exploring interlinkage of data on development activities, health and environment for decision-making concerning sustainability. In 1995, intersectoral consultations and analysis for this purpose will be carried out in selected countries. Interested international bodies are encouraged to join in these efforts. The project will focus on developing and testing linkage-based indicators of relevance to policy at national and local levels.

25. Related activities: it is recognized that many other activities are ongoing, as noted in the introduction to this report. The scientific community, with the support and advice of United Nations system organizations, other intergovernmental organizations, Governments, non-governmental organizations and other representatives of major groups, is encouraged to undertake development of indicators for issues where no suitable indicators exist.

26. A progress report will be provided to the Commission on Sustainable Development at its fourth session, in 1996.

Menu of indicators for sustainable development

27. The menu of indicators for sustainable development presented below should be seen as a flexible menu from which countries can choose indicators according to national priorities, problems and targets. The indicators are presented in a Driving force-State-Response framework. "Driving force" indicators indicate human activities, processes and patterns that impact on sustainable development. "State" indicators indicate the state of sustainable development and "Response" indicators indicate policy options and other responses to changes in the state of sustainable development. The social, economic, environmental and institutional aspects of sustainable development are covered by this menu of indicators following the chapters of Agenda 21.

Category	Chapter of Agenda 21	Driving force indicators	State indicators	Response indicators
Social a/	3. Combating poverty	Employment rate (percentage) Ratio of average female wage to average male wage (percentage)	Population living in absolute poverty (number and percentage) Gini coefficient of income	
	5. Demographic dynamics and sustainability	Population growth rate (percentage) Net migration rate (people/year)	Population density (people per square kilometre (km^2))	Total fertility rate
	36. Promoting education, public awareness and training (including gender issues)	Rate of growth of school-age population Primary school enrolment ratio (percentage) Secondary school enrolment ratio (percentage)	Adult literacy rate (percentage) Population reaching grade five of primary education (percentage) Mean number of years of schooling	Gross domestic product (GDP) spent on education (percentage) Females per 100 males in secondary school (number) Women per 100 men in the labour force (percentage)
	6. Protecting and promoting human health	People without access to sufficient and safe drinking water (percentage) People without access to adequate sanitation (percentage) People exposed to high concentrations of health-damaging air pollution (percentage) People without adequate food supply (percentage)	Infant mortality rate (per 1,000 live births) Life expectancy at birth (years) Maternal mortality rate (per 1,000 live births)	GDP spent on health (percentage) Population covered by primary health care (percentage) Eligible population that has been fully immunized against key communicable diseases (percentage) Women of child-bearing age using/with access to family planning (percentage) National health expenditure devoted to local health services (percentage)

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Category	Chapter of Agenda 21	Driving force indicators	State indicators	Response indicators
	7. Promoting sustainable human settlement development (including traffic and transport)	Rate of growth of urban population (percentage) Transport fuel consumption per capita (litres) Number of megacities (Population 10 million or more)	Population in urban areas (percentage) Area and population of marginal settlements (km^2, number) Cost/number of injuries and fatalities related to natural disasters b/ (US dollars, number) Floor area per person (square metres (m^2)) House price-to-income ratio	Expenditure on low-cost housing (US dollars) Expenditure on public transportation (US dollars) Infrastructure expenditures per capita (US dollars) Housing credit portfolio
Economic a/	2. International cooperation	Real GDP per capita growth rate (percentage) Exports of goods and services (US dollars) Imports of goods and services (US dollars)	GDP per capita (US dollars) Environmentally adjusted domestic product (EDP) per capita/ environmentally adjusted value added (US dollars) Share of manufacturing value added in GDP (percentage) Export concentration ratio (percentage)	Investment share in GDP (percentage) Participation in regional trade agreements (yes/no)
	4. Changing consumption patterns c/	Depletion of mineral resources (percentage of proved reserves) Annual energy Consumption per capita (dollars)	Proved mineral reserves (tons) (t) Proved energy reserves (oil equivalents) Lifetime of proved energy reserves (years) Share of natural resource-intensive industries in manufacturing value added (percentage) Share of manufactures in merchandise exports (percentage)	Ratio of consumption of renewable resources to that of non-renewable resources (percentage)

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Category	Chapter of Agenda 21	Driving force indicators	State indicators	Response indicators
	33. Financial resources and mechanisms	Ratio of net resource transfer/GDP (percentage)	Total official development assistance (ODA) given or received (percentage of GDP) Debt/GDP (percentage) Debt service/export (percentage)	Environmental protection expenditure as percentage of GDP Environmental taxes and subsidies as percentage of government revenue Amount of new or additional funding for sustainable development given/ received since 1992 (US dollars) Programme of integrated environmental and economic accounting (yes/no) Debt relief
	34. Transfer of environmentally sound technology, cooperation and capacity-building			
Environmental Water	18. Protection of the quality and supply of freshwater resources	Annual withdrawals of groundwater and surface water as percentage of available water Domestic consumption of water per capita (cubic metres (m^3))	Groundwater reserves (m^3) Concentration of faecal coliform in freshwater bodies (number/100 millilitres (ml)) Biochemical oxygen demand (BOD) and chemical oxygen demand (COD) in water bodies (milligrams (mg)/l)	Waste-water treatment (percentage of population served, total and by type of treatment)

Category	Chapter of Agenda 21	Driving force indicators	State indicators	Response indicators
	17. Protection of the oceans, all kinds of seas and coastal areas	Catches of marine species (t) Population growth in coastal areas (percentage) Discharges of oil into coastal waters (t) Releases of nitrogen and phosphorus into coastal waters (t)	Deviation in stock of marine species from maximum sustained yield level (MSY) (percentage) Ratio of MSY abundance to actual average abundance (percentage) Algae index	Participation in maritime treaties/ agreements (yes/no)
Land	10. Integrated approach to the planning and management of land resources	Land use	Area affected by soil erosion (km^2)/erosion index	Land reform policy (yes/no) Decentralized local-level natural resource management (yes/no)
	12. Managing fragile ecosystems: combating desertification and drought	Fuelwood consumption per capita (m^3) Livestock levels per km^2 in dryland Population living below poverty line in dryland areas (percentage)	Land affected by desertification (km^2)/desertification index Drought frequency	
	13. Managing fragile ecosystems: sustainable mountain development			
	14. Promoting sustainable agriculture and rural development	Use of agricultural pesticides (t/km^2) Use of fertilizers (t/km^2) Arable land (hectares (ha)) per capita Irrigation of arable land (percentage)	Area affected by salinization and waterlogging (km^2)	Cost of extension services provided and cost of agricultural research (US dollars) Area of land reclaimed (km^2)
Other natural resources	11. Combating deforestation	Deforestation rate ((km^2)/annum) Annual roundwood production (m^3)	Timber stocks (m^3) Forest area (km^2) Wood consumption as percentage of energy consumption	Reforestation rate ((km^2)/annum) Protected forest area as percentage of total land area

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Category	Chapter of Agenda 21	Driving force indicators	State indicators	Response indicators
	15. Conservation of biological diversity		Threatened, extinct species (number)	Protected area as percentage of total land area
	16. Environmentally sound management of biotechnology			
Atmosphere	9. Protection of the atmosphere	Emissions of carbon dioxide (CO_2) (t) Emissions of oxides of sulphur (SO_x) and oxides of nitrogen (No_x) (t) Consumption of ozone-depleting substances (t)	Ambient concentrations of sulphur dioxide (SO_2), carbon monoxide (CO), oxides of nitrogen (NO_x), ozone (O_3) and total suspended particulates (TSP) in urban areas (parts per million)	Expenditure on air pollution abatement (US dollars) Reductions in the emissions of CO_2, SO_x and NO_x (percentage per year)
Waste	21. Environmentally sound management of solid wastes and sewage-related issues	Generation of industrial and municipal waste (t)	Waste disposed/ capita (t)	Expenditure on waste collection and treatment (US dollars) Waste recycling rates (percentage) Municipal waste disposal (t/capita) Waste reduction rates per unit of GDP (t/year)
	19. Environmentally sound management of toxic chemicals			
	20 and 22. Environmentally sound management of hazardous wastes and radio-active wastes	Generation of hazardous waste (t) Imports and exports of hazardous waste (t)	Area of land contaminated by hazardous waste (km^2)	Expenditure on hazardous waste treatment (US dollars)
Institutional	35. Science for sustainable development			

Category	Chapter of Agenda 21	Driving force indicators	State indicators	Response indicators
	37. National mechanisms and international cooperation for capacity-building			
	8, 38, 39 and 40. Decision-making structures		Mandated (environmental impact assessment (EIA) (yes/no) Programmes for national environmental statistics and indicators for sustainable development (yes/no) Sustainable development strategies (yes/no) National councils for sustainable development (yes/no) Main telephone lines per 100 inhabitants (number)	Ratification of international agreements related to sustainable development (number) Number of local government employees per 1,000 of population (number) Personnel expenditure ratio (proportion of recurrent expenditure spent on wage costs (percentage)
	Strengthening of "traditional information" (part of 40)		Representatives of indigenous people in national councils for sustainable development (yes/no) Existence of database for traditional knowledge information (yes/no)	
	Section III (23-32). Strengthening the role of major groups		Representatives of major groups in national councils for sustainable development (yes/no)	

Notes

a/ Many of these indicators exemplify and represent large, well-established sets of indicators. Processes to enhance the relevance of these sets to sustainable development are under way and should be encouraged.

b/ Indicators of vulnerability are to be developed following the Programme of Action for the Sustainable Development of Small Island Developing States, as contained in the Report of the Global Conference on the Sustainable Development of Small Island Developing States, Bridgetown, Barbados, 25 April-6 May 1994 (United Nations publication, Sales No. E.94.I.18 and Corr.1 and 2), chap. I, resolution 1, annex II.

c/ Production and consumption patterns are also reflected in particular by the following indicators:

Share of manufacturing value added in GDP (under "Economic")

Export concentration ratio (under "Economic")

Ratio of consumption of renewable resources to that of non-renewable resources (under "Economic")

Transport fuel consumption per capita (under "Social")

Domestic consumption of water per capita (under "Environmental/water")

Fuelwood consumption per capita (under "Environmental/land")

Annual roundwood production (under "Environmental/other natural resources"

Wood consumption as percentage of energy consumption (under "Environmental other natural resources")

Consumption of ozone-depleting substances (under "Environmental/ atmosphere")